

**Spurling, Norman**

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**From:** Miller, Robert  
**Sent:** Thursday, May 09, 2013 9:34 AM  
**To:** Spurling, Norman  
**Subject:** FW: CA Dept of Fish & Game rodenticide incident data, email 3/3  
**Attachments:** P2674.pdf; P2675.pdf; P2676a.pdf; P2676b.pdf; P2676c.pdf; P2678.pdf; P2680.pdf; P2684.pdf; P2693.pdf

Robert A. Miller  
EIIIS Database Manager  
Environmental Fate and Effects Division  
Office of Pesticide Programs  
United States - Environmental Protection Agency  
1200 Pennsylvania Avenue, N.W., Washington D.C.  
Mail Code: 7507P  
Phone: (703) 347-8012

## -----Original Message-----

**From:** Russell Wasem  
**Sent:** Wednesday, May 08, 2013 3:32 PM  
**To:** Anderson, Brian; Mastrotta, Nicholas; Housenger, Justin; Miller, Robert; Garrison, Scott; Berol, David  
**Cc:** Parsons, Laura; Anderson, Neil; Berol, David  
**Subject:** CA Dept of Fish & Game rodenticide incident data, email 3/3

## -----Original Message-----

**From:** Ann Hanger [<mailto:ahanger@cdpr.ca.gov>]  
**Sent:** Wednesday, May 08, 2013 3:24 PM  
**To:** Parsons, Laura; Russell Wasem  
**Cc:** Bouve, Kate  
**Subject:** Additional rodenticide data, part 3 of 3

Part 3 of 3

Ann Hanger  
Pesticide Registration Branch  
California Department of Pesticide Regulation  
(916) 324-3535



**DEPARTMENT OF FISH AND GAME**  
**WILDLIFE BRANCH**  
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of  
IO24830-001  
-002

**Lab No:** P-2674  
**Necropsy** N12-145, N12-152  
**CAHFS** D1213119, D1213120

**Date:** September 8 and 15, 2012  
**Species:** Bobcats (2)  
**Listing Status:** no special status

**To:** Cathy Fisher  
Santa Barbara Agricultural Commissioner

**Report Date:** December 20, 2012

**Remarks**

Two bobcats from Santa Barbara County (separate incidents) were necropsied and tested for anticoagulant rodenticide exposure.

**Background**

Two bobcats, *Lynx rufus*, were brought to the Animal Rescue Team in Santa Barbara County and died soon after admission. The first, a female kitten, was found on Hope Ranch on September 8 and died quickly after admission. The second, an adult male, was admitted on September 14, 2012, and died the next day. This bobcat was found near the highway and appeared to have mange. The two bobcat carcasses were sent to the DFG Wildlife Investigations Laboratory for necropsy examination and testing.

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**RESULTS OF EXAMINATION**

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Both bobcats were necropsied at the WIL on November 27, 2012. The kitten was found to be emaciated but without any signs of external trauma. There was no unexplained bleeding in the body cavities or subdermally (under the skin). The adult male bobcat was found to have mange and tissue trauma consistent with a vehicle strike. A liver sample from each bobcat was submitted to the California Animal Health and Food Safety Laboratory for anticoagulant rodenticide analysis. Additionally, tissues were examined microscopically by a veterinary pathologist: findings for the adult male were consistent with notodetric mange and trauma, while no significant histological findings were found for the kitten. Anticoagulant rodenticides were detected in the liver tissue of both animals (Table 1).

Anticoagulants disrupt normal blood-clotting mechanisms and cause mortality due to excessive internal bleeding. Signs of anticoagulant toxicosis include subdermal bruising and excess blood in the body cavities. Exposure to predatory and scavenging wildlife has been well documented and is the result of secondary exposure through contaminated prey items. Anticoagulant poisoning is diagnosed when signs of anticoagulant toxicosis, such as unexplained bleeding, are present and anticoagulants are present in liver tissue. Although definitive signs of anticoagulant poisoning were not observed in the kitten, there were

moderately high concentrations of two anticoagulant rodenticide compounds in the liver which may or may not have contributed to the death of this bobcat.

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**Table 1. Liver residues of anticoagulant rodenticides (ng/g, wet weight).**

Anticoagulant Rodenticide	Adult Male	Female Kitten	Reporting Limit
Brodifacoum	ND <sup>1</sup>	95	10
Bromadiolone	Trace	390	50
Chlorophacinone	ND	ND	250
Diphacinone	Trace	Trace	250
Coumatetralyl	ND	ND	250
Warfarin	ND	ND	250

<sup>1</sup>ND = Not detected at or above reporting limit.

**WILDLIFE INVESTIGATIONS LABORATORY**

*Stella McMillin*

**Stella McMillin, Environmental Scientist  
Wildlife Investigations Laboratory**

**Approved**

*Steve G. Torres*

**Steve Torres, Program Manager,  
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**Cc: Deana Clifford,  
DFG Wildlife Investigations Laboratory**

**Richard Bireley,  
Department of Pesticide Regulation  
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**Debbie Daniels,  
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**Julia DiSienna,  
Animal Rescue Team**

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**Lab No:** P-2675  
**WPCL No.** L-366-12

**Date of loss:** 6/27/11, 9/26/12  
**Sample:** 2 San Joaquin kit foxes  
**Listing status:** Federal endangered,  
State threatened

**To:** Glenn Fankhauser  
Kern County Agricultural Commissioner's Office

**Report Date:** January 10, 2013

**Remarks**

Investigation of pesticide exposure in two San Joaquin kit foxes collected by the Endangered Species Recovery Program (ESRP) in Kern County.

**Background**

The ESRP and the Department of Fish and Wildlife (DFW) cooperate to monitor anticoagulant rodenticide exposure of San Joaquin kit foxes, *Vulpes macrotis mutica*, in Kern County. This species inhabits the urban environment and has high exposure rates to anticoagulant rodenticides. Although the initial study is over, additional carcasses are saved to determine the effectiveness of future regulation change. Twenty carcasses were collected by ESRP and submitted to the DFW Wildlife Investigations Laboratory.

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**RESULTS OF EXAMINATION**

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Five carcasses were necropsied on November 28, 2012 and liver tissue was saved from each for future analysis. Two of the carcasses showed signs of pesticide poisoning during necropsy and their liver tissues were submitted to the California Health and Food Safety Laboratory in Davis for toxicological analysis.

**Results for Fox 1**

Kit fox 1 (N12-166) was a juvenile male and had been found dead in a parking lot in Bakersfield on September 26, 2012. Necropsy revealed that it was in good nutritional shape but had hemorrhages in its chest, abdomen, and around its nose. No signs of physical trauma were found. This fox was submitted for anticoagulant rodenticide analysis (Figure 1, Table 1).

Two anticoagulant rodenticides were detected in the liver tissue, brodifacoum at 1.6 mg/kg and bromadiolone at 0.18 mg/kg. Both of these materials are second-generation anticoagulant rodenticides. Anticoagulants disrupt normal blood-clotting mechanisms and cause mortality due to excessive internal bleeding. Second-generation materials are generally more toxic and more persistent in body tissues than

the first- generation materials. These concentrations are consistent with other cases of anticoagulant toxicosis. Signs of anticoagulant toxicosis include subdermal bruising and excess blood in the body cavities. Anticoagulant rodenticides difethialone, chlorophacinone, diphacinone, and warfarin were analyzed for but not detected.

Given the moderately high concentrations of brodifacoum and bromadiolone, as well as the hemorrhaging without signs of physical trauma, it is highly likely that Fox 1 died as a result of anticoagulant rodenticide toxicosis. Brodifacoum and bromadiolone are used legally for the control of commensal rodents. Nontarget losses of predators and scavengers are typically the result of secondary exposure by eating contaminated rodents.

Figure 1. Blood around the nose of SJKF indicating anticoagulant rodenticide toxicosis.



#### Results for Fox 2

Kit fox 2 (N12-165) was also a juvenile male and had been found dead under the bleachers of Golden Valley High School on June 27, 2011. The carcass was moderately autolyzed and its rear legs showed hyperflexion common in animals that have died from strychnine poisoning. This fox was submitted for strychnine and anticoagulant rodenticide analysis (Table 1, Figure 2).



Strychnine was detected in the liver tissue above the reporting limit (0.5 ppm) using gas chromatography/mass spectrometry but not quantified. No anticoagulant rodenticides were detected above the reporting limit.

Strychnine inhibits competitively and reversibly the inhibitory neurotransmitter glycine at postsynaptic neuronal sites in the spinal cord and medulla. This results in unchecked reflex stimulation of motor neurons affecting all the striated muscles. Because the extensor muscles are relatively more powerful than the flexor muscles, they predominate to produce generalized rigidity and tonic-clonic seizures. Death results from anoxia and exhaustion.

Given the presence of strychnine in the liver and the stiff-legged appearance of the fox, it is very likely that Fox 2 died as a result of strychnine poisoning. Strychnine is legally used only when applied underground for control of gophers. Non-target losses are typically the result of primary exposure.

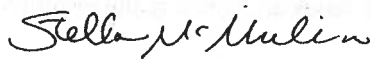
Figure 2. Stiff-legged appearance of SJKF indicating strychnine exposure.



Table 1. Necropsy and toxicological findings for 2 San Joaquin kit foxes.

	Fox 1	Fox 2
Date Found	9/26/2012	6/27/11
Location Found	CSU Bakersfield	Golden Valley High School
Necropsy results	Unexplained bleeding	Stiff legged
Lab results	Brodifacoum 1.6 mg/kg Bromadiolone 0.18 mg/kg	Positive for strychnine No anticoagulant rodenticides detected

**WILDLIFE INVESTIGATIONS LABORATORY**



**Stella McMillin, Environmental Scientist  
Wildlife Investigations Laboratory**

**Approved**



**Steve Torres, Program Manager,  
Wildlife Investigations Laboratory**

**Cc: Jeanne Martin,  
DPR Enforcement**

**Rich Bireley,  
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**Dr. Debbie Daniels,  
DPR Registration**

**Robert Miller,  
USEPA**



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**Lab No:** P-2676a  
**Necropsy:** N12-106  
**CAHFS:** D1213386

**Date:** April 6, 2011  
**Species:** Bald eagle  
**Listing Status:** Protected (Bald and Golden Eagle Protection Act)

**To:** Mary Pfeiffer,  
Shasta County Agricultural Commissioner

**Report Date:** December 19, 2012

**Remarks**

Surveillance of lead and anticoagulant rodenticides in bald eagle from Shasta County.

**Background**

A bald eagle, *Haliaeetus leucocephalus*, was found dead near Anderson in Shasta County on April 6, 2011. The eagle was brought to DFG Region 1 headquarters and stored until delivery to DFG Wildlife Investigations Laboratory in July 2012. The eagle was submitted to the California Animal Health and Food Safety Laboratory on December 2012 to determine cause of death and to determine exposure to lead and anticoagulant rodenticides.

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**RESULTS OF EXAMINATION**

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The cause of death of the eagle could not be conclusively determined but appeared related to a bilateral diffuse pulmonary hemorrhage. Anticoagulant rodenticides were detected in the liver and may have been the cause of the pulmonary hemorrhage. The anticoagulant rodenticides detected were brodifacoum (36 ng/g) and bromadiolone (trace). There was also a liver rupture of unknown origin. No lead was detected in the liver tissue. Bacteriology and virology screens for pathogenic organisms were negative.

**WILDLIFE INVESTIGATIONS LABORATORY**

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**Steve Torres, Program Manager,  
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**Richard Callas,  
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**Richard Bireley,  
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**Debbie Daniels,  
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**Lab No:** P-2676b  
**Necropsy:** N12-107  
**CAHFS:** D1213387

**Date:** December 23, 2011  
**Species:** Bald eagle  
**Listing Status:** Protected (Bald and Golden Eagle Protection Act)

**To:** Mary Pfeiffer,  
Shasta County Agricultural Commissioner

**Report Date:** December 19, 2012

**Remarks**

Surveillance of lead and anticoagulant rodenticides in bald eagle from Shasta County.

**Background**

A bald eagle, *Haliaeetus leucocephalus*, was found in Whitmore in Shasta County dead by USDA Animal Services on December 23. The eagle was brought to DFG Region 1 headquarters and stored until delivery to DFG Wildlife Investigations Laboratory in July 2012. The eagle was submitted to the California Animal Health and Food Safety Laboratory on December 2012 to determine cause of death and to determine exposure to lead and anticoagulant rodenticides.

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**RESULTS OF EXAMINATION**

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The presumptive cause of death was lead toxicity. The eagle was found to be severely emaciated with muscle atrophy and lack of fat deposits and severe anemia. These signs, in addition to 33 µg/g (ppm) lead and elevated iron concentrations in the liver tissue, support the diagnosis of lead toxicity.

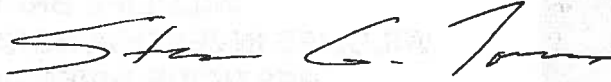
A trace of the anticoagulant rodenticide brodifacoum was detected in the liver tissue. Bacteriology and virology screens for pathogenic organisms were negative.

**WILDLIFE INVESTIGATIONS LABORATORY**

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**Jeanne Martin,  
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**Robert Miller,  
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**Lab No:** P-2676c  
**Necropsy:** N12-108  
**CAHFS:** D1213388

**Date:** January 10, 2011  
**Species:** Bald eagle  
**Listing Status:** Protected (Bald and Golden Eagle Protection Act)

**To:** Mary Pfeiffer,  
Shasta County Agricultural Commissioner

**Report Date:** December 19, 2012

**Remarks**

Surveillance of lead and anticoagulant rodenticides in bald eagle from Shasta County.

**Background**

A bald eagle, *Haliaeetus leucocephalus*, was found in Redding in Shasta County on January 10, 2011 and brought to DFG Region 1 headquarters and stored until delivery to DFG Wildlife Investigations Laboratory in July 2012. The eagle was thought to have been fighting in flight with another eagle prior to death. The eagle was submitted to the California Animal Health and Food Safety Laboratory on December 2012 to determine cause of death and to determine exposure to lead and anticoagulant rodenticides.

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**RESULTS OF EXAMINATION**

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The cause of death was not determined but the eagle showed signs of trauma such as soft tissue hemorrhage around the head and neck and a puncture wound in the chest. No anticoagulant rodenticides or lead were detected in the liver and bacteriology and virology screens for pathogenic organisms were negative.

**WILDLIFE INVESTIGATIONS LABORATORY**

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**Stella McMillin, Environmental Scientist**  
**Wildlife Investigations Laboratory**

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**Steve Torres, Program Manager,  
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DFG Wildlife Investigations Laboratory**

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DFG Region 1**

**Richard Bireley,  
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**Debbie Daniels,  
Department of Pesticide Regulation  
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**Jeanne Martin,  
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**Robert Miller,  
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Lab No: P-2678  
Necropsy N12-145, N12-152  
CAHFS D1213802

Date: December 7, 2012  
Species: Red-tailed hawk  
Listing Status: no special status

To: Rick Gurrola,  
Tehama County Agricultural Commissioner

Report Date: May 8, 2013

**Remarks**

Pathology and toxicology to determine cause of death of red-tailed hawk in Shasta County.

**Background**

A red-tailed hawk *Buteo jamaicensis* was brought into Tehama Wild Care on December 6, 2012. The hawk had been found in Red Bluff and had no apparent injuries but flaccid paralysis of the legs. The hawk was treated with atropine and activated charcoal but died the next day. The hawk was shipped to DFW Wildlife Investigations Laboratory to determine cause of death.

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**RESULTS OF EXAMINATION**

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The hawk was submitted to the California Animal Health and Food Safety Laboratory for necropsy and laboratory diagnostics. No signs of external trauma or emaciation were noted. The brain cholinesterase level was within acceptable range for red-tailed hawks, indicating no recent measurable exposure to organophosphate or carbamate pesticides. All heavy metals detected in liver tissue were within normal range. Phosphides were not detected in the gastrointestinal tract, indicating no recent exposure to either zinc phosphide or aluminum phosphide. No anticoagulant rodenticides were detected. A lung infection was indicated by histological analysis.

**WILDLIFE INVESTIGATIONS LABORATORY**

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Wildlife Investigations Laboratory

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**Steve Torres, Program Manager,  
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**Cc: Richard Bireley,  
Department of Pesticide Regulation  
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**Dr. Debbie Daniels,  
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Registration Branch**

**Jeanne Martin,  
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**Karen Scheuermann,  
Tehama Wild Care**

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Lab No: P-2680  
CAHFS D1391850

Date: February 15, 2013  
Species: Northern spotted owl  
Listing Status: Federally threatened

To: Files

Report Date: May 7, 2013

**Remarks**

Pathology and toxicology of northern spotted owl in Tuolumne County for surveillance purposes.

**Background**

A northern spotted owl, *Strix occidentalis caurina*, was submitted to a wildlife rehabilitation facility in Tuolumne County with an injured leg. The owl was transferred to the UC Davis Veterinary Hospital after a few days because of poor progress. The veterinary hospital determined that the injury precluded recovery and euthanized the bird. The owl was submitted to the California Animal Health and Food Safety Laboratory at UC Davis to sample for lead, trichomoniasis, and anticoagulant rodenticides for surveillance purposes.

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**RESULTS OF EXAMINATION**

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The owl was positive for West Nile Virus and had associated heart lesions. Trace levels of the anticoagulant brodifacoum were detected but were not thought to be contributory to the owl's death. Heavy metals, Chlamydia, Salmonella, and lead were not detected in samples.

**WILDLIFE INVESTIGATIONS LABORATORY**

*Stella McMillin*

Stella McMillin, Environmental Scientist  
Wildlife Investigations Laboratory

Cc: Debbie Daniels,  
Department of Pesticide Regulation  
Registration Branch



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**Lab No:** P-2684  
**Necropsy** N13-025

**Date:** January 21, 2013  
**Species:** Red-tailed hawk  
**Listing Status:** no special status

**To:** Files

**Report Date:** May 7, 2013

**Remarks**

Red tailed hawk from Ventura County.

**Background**

A female red-tailed hawk, *Buteo jamaicensis*, was brought to Wildlife Care in Ventura County after being found in a subdued condition. The hawk died the following day. The carcass was submitted to WIL for analysis.

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**RESULTS OF EXAMINATION**

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A gross necropsy was performed at WIL. The hawk was well-fatted and had recently consumed a rodent. Gunshot was found in the neck area accompanied with bleeding. The cause of death was determined to be gunshot. No further analysis was performed.

**WILDLIFE INVESTIGATIONS LABORATORY**

*Stella McMillin*

**Stella McMillin, Environmental Scientist  
Wildlife Investigations Laboratory**

**Debbie Daniels,  
Department of Pesticide Regulation  
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**Lab Number P-2693**  
**CAHFS No. D1304044**

**Date of loss: 3/23/13**  
**Sample: Domestic geese (2)**  
**Listing status: No special status**

**Report Date: May 8, 2013**

**To: Robert Mulherin,**  
**Riverside County Agricultural Commissioner's Office**

**Remarks**

Pesticide investigation in domestic geese from Wildomar in Riverside County.

**Background**

On March 23, 2013, DFW Southern District Enforcement staff received a report of several domestic geese dying from seizures around a pond in a housing development called The Farm in Wildomar in Riverside County. Enforcement staff collected two goose carcasses and shipped them to DFW Wildlife Investigations Laboratory to determine cause of death. No suspicious material was found near the pond.

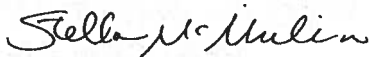
**RESULTS OF EXAMINATION**

The two carcasses were submitted to the California Animal Health and Food Safety Laboratory (CAHFS) for full necropsy. Both geese were in good nutritional condition and tested negative for botulism, Salmonella, Avian Influenza, and West Nile Virus. Brain cholinesterase activity (which may indicate exposure to organophosphates or carbamates) was normal. Stomach contents of both geese contained both strychnine and zinc phosphide.

Both strychnine and zinc phosphide are rodenticides. Strychnine is only legally applied underground for pocket gopher control. Strychnine is a neural toxicant. Clinical signs of poisoning include anxiety, stiffness, and violent seizures. Strychnine is very highly toxic to birds with LC50 values of 2-5 ppm (mallards). Zinc phosphide is converted to toxic phosphine gas in the digestive tract which causes respiratory distress and asphyxiation. Death occurs within 24 hours for birds. Zinc phosphide is highly toxic to birds with an LD50 of 67 ppm (mallards).

The cause of death of both geese was determined to be strychnine with zinc phosphide as a likely contributing factor.

**WILDLIFE INVESTIGATIONS LABORATORY**



**Stella McMillin, Staff Environmental Scientist  
Wildlife Investigations Laboratory**

**Approved**



**Steve Torres, Program Manager,  
Wildlife Investigations Laboratory**

**Cc: Warden Kyle Chang,  
DFW Southern Enforcement District**

**Jeanne Martin,  
DPR Enforcement**

**Rich Bireley,  
DPR Registration**

**Dr. Debbie Daniels,  
DPR Registration**

**Robert Miller,  
USEPA**